

Anti-staling composition and bakery products comprising this composition

Field of the invention

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The invention relates to bakery products having improved softness and which are less susceptible to staling on storage.

Background to the invention

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Soft bakery products such as bread, cake, doughnuts are widely consumed as part of daily food intake.

The freshness of these products, especially of bread, is
15 generally appreciated by consumers. One of the parameters determining the perception of freshness is the softness of the bakery product. It is generally considered that the softer the bakery product is, the fresher it is. Furthermore it is desired that this softness be maintained when the bakery product is
20 stored. Reduction of product softness, which may partly be due to drying of the product, is known in the art as staling of the products.

To prevent staling, anti-staling agents are added to bakery
25 compositions. Anti-staling agents known in the art are e.g. emulsifiers such as calcium stearoyl lactylate (CSL), SSL and glycerolmonostearate.

Alternative anti-staling agents are enzymes or mixtures of enzymes. For example bacterial amylases or maltogenic amylases
30 may be added to bread dough as anti-staling agents.

Although these anti-staling agents give some improvement in maintaining the softness of bakery compositions, especially bread, further improvement is desired.

- 5 It is an object of the invention to provide bakery product compositions providing a bakery product, which is soft and stays soft on storage.

Definition of the invention

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It has surprisingly been found that bakery products comprising a sterol and/or stanol ester of fatty acids in combination with an emulsifier selected from the group comprising calcium stearyl lactylate, sodium stearyl lactylate, glycerol
15 monostearate, sodium stearyl fumarate, succinilated monoglyceride, ethoxylated mono- and diglycerides, diacetyl tartaric acid esters of mono- and diglycerides, propylene glycol monoesters, polyglycerolesters, sorbitan esters or polysorbates, lecithin or a combination thereof, are soft and
20 show a reduced staling on storage.

Therefore the invention relates to an anti-staling composition for bakery products, said anti-staling composition comprising a sterol and/or stanol ester of fatty acids and an emulsifier
25 selected from the group comprising calcium stearyl lactylate, sodium stearyl lactylate, glycerol monostearate, sodium stearyl fumarate, succinilated monoglyceride, ethoxylated mono- and diglycerides, diacetyl tartaric acid esters of mono- and diglycerides, propylene glycol monoesters,
30 polyglycerolesters, sorbitan esters or polysorbates, lecithin or a combination thereof, or a combination thereof, wherein the weight ratio of the emulsifier to sterol ester or stanol ester or the combination thereof is between 1 to 1 and 1 to 50.

In a further aspect the invention relates to bakery products comprising the anti-staling composition.

5 Detailed description of the invention

In the context of this specification and claims all percentage is a weight percentage on total weight of the flour in the bakery composition.

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Where reference is made to a sterol or stanol ester, the ester of sterol or stanol and a fatty acid is meant.

The anti-staling composition according to the invention
15 comprises a sterol and/or stanol fatty acid ester.

Sterols or phytosterols, also known as plant sterols or vegetable sterols can be classified in three groups, 4-desmethylsterols, 4-monomethylsterols and
20 4,4'-dimethylsterols. In oils they mainly exist as free sterols and sterol esters of fatty acids although sterol glucosides and acylated sterol glucosides are also present. There are three major phytosterols namely beta-sitosterol, stigmasterol and campesterol. Schematic drawings of the components meant are as
25 given in "Influence of Processing on Sterols of Edible Vegetable Oils", S.P. Kochhar; Prog. Lipid Res. 22: pp. 161-188.

The respective 5-alpha- saturated derivatives such as
30 sitostanol, campestanol and ergostanol and their derivatives are in this specification referred to as stanols.

Preferably the sterol or stanol is selected from the group

comprising fatty acid ester of β -sitosterol, β -sitostanol, campesterol, campestanol, stigmasterol, brassicasterol, brassicastanol or a mixture thereof.

5 Products comprising sterol or stanol are known in the art. WO-A-03/055324 discloses bread rolls comprising sterol esters. These compositions do not contain an emulsifier.

WO-A-02/82929 discloses compositions comprising sterolester and
10 fibre. Application of these compositions in a bakery product is disclosed.

US-A-2002/0016317 discloses a peanut spread comprising sterolester.

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EP-A-1275309 discloses a spread comprising sterolester and a low amount of emulsifier.

The sterols in the current invention are esterified with a
20 fatty acid. Preferably the sterols are esterified with one or more C₂₋₂₂ fatty acids. For the purpose of the invention the term C₂₋₂₂ fatty acid refers to any molecule comprising a C₂₋₂₂ main chain and at least one acid group. Although not preferred within the present context the C₂₋₂₂ main chain may be partially
25 substituted or side chains may be present. Preferably, however the C₂₋₂₂ fatty acids are linear molecules comprising one or two acid group(s) as end group(s). Most preferred are linear C₈₋₂₂ fatty acids as these occur in natural oils.

30 Suitable examples of any such fatty acids are acetic acid, propionic acid, butyric acid, caproic acid, caprylic acid, capric acid. Other suitable acids are for example citric acid, lactic acid, oxalic acid and maleic acid. Most preferred are

myristic acid, lauric acid, palmitic acid, stearic acid, arachidic acid, behenic acid, oleic acid, cetoleic acid, erucic acid, elaidic acid, linoleic acid and linolenic acid.

5 When desired a mixture of fatty acids may be used for esterification of the sterols. For example, it is possible to use a naturally occurring fat or oil as a source of the fatty acid and to carry out the esterification via an interesterification reaction.

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In a preferred embodiment, the fatty acid in the esterified sterol or stanol is derived from sunflower oil, rapeseed oil, safflower oil, coconut oil, or a mixture thereof.

Most preferred the fatty acid in the esterified sterol or
15 stanol is derived from sunflower oil because this leads to the best reduction in staling rate.

Because of improved initial softness and reduced staling, the inclusion of a sterolester is preferred over the inclusion of a
20 stanolester.

According to an alternative embodiment, the anti-staling composition comprises a combination of a sterolester and a stanolester.

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The anti-staling composition further comprises an emulsifier selected from the group comprising calcium stearoyl lactylate (CSL), sodium stearoyl lactylate (SSL), glycerol monostearate (GMS), sodium stearoyl fumarate, succinilated monoglyceride, ethoxylated mono- and diglycerides, diacetyl tartaric acid
30 esters of mono- and diglycerides, propylene glycol monoesters, polyglycerolesters, sorbitan esters or polysorbates, lecithin or a combination thereof.

It was found that the combination of the emulsifier and the sterol or stanol fatty acid ester has a surprisingly good effect on the increase of the softness and decrease of the staling rate of bread and other bakery products. Moreover the combination of ingredients also has a positive effect on bread volume. The method to determine staling and the method to determine softness and bread volume are described in the examples.

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Preferably the emulsifier is selected from the group comprising calcium stearoyl lactylate (CSL), sodium stearoyl lactylate (SSL), glycerol monostearate (GMS), sodium stearoyl fumarate, succinilated monoglyceride, ethoxylated mono- and diglycerides, diacetyl tartaric acid esters of mono- and diglycerides, propylene glycol monoesters, polyglycerolesters, sorbitan esters or polysorbates or a combination thereof.

The more preferred emulsifier is selected from the group comprising CSL, SSL, GMS, diacetyl tartaric acid ester of monoglyceride (DATEM) or a combination thereof. Even more preferred the emulsifier is selected from the group comprising CSL, SSL, GMS or a combination thereof. Because of its high effect in increase in softness and anti-staling, the most preferred emulsifiers are CSL and SSL.

To achieve optimal effect in anti-staling the weight ratio of the emulsifier to sterol ester or stanol ester or the combination thereof is between 1 to 1 and 1 to 50, preferably between 1 to 6 and 1 to 30.

In a preferred embodiment the antistaling composition comprises from 1 to 20 wt% emulsifier and from 99 to 80 wt% sterol ester or stanol ester or combination thereof.

5 Most preferred the antistaling composition essentially consists of sterol/stanolester and emulsifier. This means that at least 80 wt% of the antistaling composition comprises emulsifier and sterol/stanolester.

10 In another aspect the invention relates to a dough comprising the anti-staling composition according to the invention. The dough preferably comprises from 0.1 to 7 wt%, more preferred from 1 to 5 wt% of the anti-staling composition.

The dough is preferably prepared by simply mixing before or
15 after kneading the ingredients to form a dough.

The invention further relates to a bakery composition comprising the anti-staling composition according to the invention.

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In a preferred embodiment the amount of anti-staling agent in the bakery products is from 1 to 10 wt%, more preferred from 2 to 7 wt% on total weight of the flour.

25 The amount of emulsifier is preferably from 0.05 to 0.6 wt%, more preferred from 0.15 to 0.3 wt% on flour.

The amount of sterolester or stanolester is preferably from 1 to 6 wt% on flour.

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The preferred bakery product in this embodiment is bread.

In general bread is appreciated for its taste, crispiness of the crust, airiness evidenced by a certain volume, crumb softness, low staling rate of the crumb during storage, and general impression of healthiness due to the presence of grains
5 and fibres.

The method to determine softness is described in the examples. The softness is preferably from 200 to 300, more preferred 200 to 260 g determined according to this method.

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Staling is determined as the reduction of softness over time. Preferred products have a staling rate of less than 100 g per day for a period of at least 5 days after baking.

15 The bread according to the invention may have any suitable shape, however loaf breads, buns, and French sticks are preferred.

In a preferred embodiment, the volume of tin bread is
20 preferably above 5 l/kg after baking and cooling down for 2 hours.

It was found that bakery products comprising the anti-staling composition according to the invention were much appreciated
25 especially because of the crumb softness and the low staling rate. Also in some cases the volume was relatively high.

The bakery products comprise conventional ingredients in addition to the anti-staling composition.

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Where the bakery product is bread, the compositions generally comprise flour and preferably also salt and yeast. Furthermore dough optionally comprises one or more leavening agents.

Examples of suitable flour are whole meal, wheat flour, rye/wheat mixtures, high gluten flour or combinations thereof. Suitable leavening agents are yeast, baking powder, sodium carbonate, sodium hydrogen carbonate. The amount and ratio of
5 flour, water and leavening agent will be determined by the person skilled in the art depending on the type of bread that is desired.

Optional further ingredients are preferably selected from the
10 group comprising fats, enzymes, other emulsifiers than those that are part of the anti-staling composition, sugar, fruit pieces such as riasins, nuts, amino acids, colourants, preservatives, flavours and combinations thereof.

15 Optionally the bakery product comprises a bread improver composition which preferably comprises a combination of carboxymethylcellulose and at least one other type of fibre such as inulin.

20 The bakery products may be prepared in any suitable process. The anti-staling composition may be added as such whereby the sterol and/or stanol ester and the emulsifier are pre-mixed or may be added as individual ingredients wherein the sterol and/or stanol ester is individually added and so is the
25 emulsifier.

Generally known processes to make bread may include any of the following steps: mixing and kneading the ingredients, dividing, proofing, moulding, proofing, baking and cooling, or optionally
30 in-stead of baking: parbaking, cooling, freezing, (optionally thawing) and baking off, or optionally after proofing: freezing, thawing (optionally), proofing and baking.

A preferred process for preparing the bakery composition comprises the steps of providing a mixture comprising at least flour, sterol ester or stanol ester, emulsifier selected from
5 the group according to the invention, optionally bread improver containing enzymes (amylase, xylanase), ascorbic acid, water, salt and yeast, followed by kneading, dividing, optionally proving, optionally moulding, baking and cooling. Optionally the products are frozen before baking or after partial baking.

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Alternatively any process that is currently used for making bread can be used. The time of addition of the sterol/stanolester during mixing is not important, but the earlier during mixing it is added the better it can be
15 distributed through the dough.

The bread prepared with the bread improver composition can be stored at ambient temperature, chilled or frozen. The bread is preferably stored frozen for optimal shelf life. If required,
20 the bread can be baked-off shortly before consumption.

According to another embodiment, the invention relates to a bakery product comprising flour and from 0.5 to 15 wt% on flour, preferably 1 to 6 wt% on flour of sterol fatty acid
25 ester and/or stanol fatty acid ester and from 0.1 to 1 wt%, preferably 0.1 to 0.5 wt% emulsifier on flour, wherein the emulsifier is selected from the group comprising calcium stearoyl lactylate, sodium stearoyl lactylate, glycerol monostearate, sodium stearoyl fumarate, succinilated
30 monoglyceride, ethoxylated mono- and diglycerides, diacetyl tartaric acid esters of mono- and diglycerides, polyglycerol esters, propylene glycol monoesters, sorbitan esters or polysorbates, lecithin or a combination thereof, more preferred

from the group comprising CSL, SSL, GMS and DATEM or a combination thereof.

The invention is illustrated by the following non-limiting
5 examples.

Examples

General

10 *Texture profile analyses*

The firmness of the crumb was measured by texture profile analysis (c.f. AACC analytical method 74-09) at 1, 4 and 5 days after baking and storage at 20°C. The firmness of the bread,
15 extrapolated at 0 days of storage and the staling rate were calculated.

Bread volume

The bread volume was determined by the rapeseed displacement
20 method and expressed in volume/kg.

Example 1; Bread comprising sterolester and CSL

Bread was prepared in a conventional process comprising the steps of providing a mixture comprising the ingredients as specified in table 1, followed by kneading, dividing, proving, baking and cooling.

Table 1 Bread recipe and quality of bread with Sterolester and CSL (amounts in g)

Ingredients	Example 1a	Example 1b	Example 1c
flour	1000	1000	1000
yeast	20	20	20
salt	20	20	20
sugar	15	15	15
Sterolester ²	15	30	60
CSL2010	4	4	4
water	570	570	570
vitamin C	0.05	0.05	0.05
Biobake Pconc	0.02	0.02	0.02
Maxlife E5	0.2	0.2	0.2
Biobake ST 710	0.1	0.1	0.1
Specific volume (l/kg)	5.64	5.81	5.65
Firmness index (%) ¹	80%	68%	74%
Staling rate index (%) ¹	82%	77%	86%

10 ¹as indexed on control

²sterolester is an ester of mainly beta sitosterol, esterified with sunflower oil.

Table 2: composition of comparison examples for example 1

Ingredients	control	Control + CSL	Sterol ester 1d	Sterolester 1e	Sterol ester 1f
flour	1000	1000	1000	1000	1000
yeast	20	20	20	20	20
salt	20	20	20	20	20
sugar	15	15	15	15	15
sterolester			15	30	60
CSL2010		4			
water	570	570	570	570	570
vitamin C	0.05	0.05	0.05	0.05	0.05
Biobake Pconc	0.02	0.02	0.02	0.02	0.02
Maxlife E5	0.2	0.2	0.2	0.2	0.2
Biobake ST 710	0.1	0.1	0.1	0.1	0.1
Specific volume (l/kg)	5.39	5.51	5.40	5.36	5.22
Firmness index (%) ¹	100%	74%	122%	101%	94%
Staling rate index (%) ¹	100%	85%	103%	115%	74%

¹as indexed on control²sterolester is an ester of mainly beta sitosterol, esterified with sunflower oil.

5 The results in Tables 1 and 2 show that CSL alone hardly affects the bread volume and reduces the firmness and staling rate. In contrast sterolesters alone have no influence on volume and increase the firmness or staling rate compared with a bread without sterolesters. The combination of sterolesters

10 and CSL improves the volume slightly. Surprisingly, it substantially decreases the firmness and reduces the staling rate.

Example 2

Bread comprising stanolester and CSL

5 The process of example 1 was used.

Table 3 Bread recipe and quality of bread stanolester and CSL

Ingredients	Example 2a	Example 2b	Example 2c
flour	1000	1000	1000
yeast	20	20	20
salt	20	20	20
sugar	15	15	15
Stanolester ²	15	30	60
CSL2010	4	4	4
water	570	570	570
vitamin C	0.05	0.05	0.05
Biobake Pconc	0.02	0.02	0.02
Maxlife E5	0.2	0.2	0.2
Biobake ST 710	0.1	0.1	0.1
Specific volume (l/kg)	5.60	5.63	5.50
Firmness index (%) ¹	72%	90%	95%
Staling rate index (%) ¹	78%	80%	93%

¹as indexed on control

10 ²stanolester is an ester of mainly beta sitostanol, esterified with sunflower oil.

Table 4; comparison examples for example 2

Ingredients	control	Control + CSL	Stanol ester 2e	Stanol ester 2f	Stanol ester 2g
flour	1000	1000	1000	1000	1000
yeast	20	20	20	20	20
salt	20	20	20	20	20
sugar	15	15	15	15	15
stanolester			15	30	60
CSL2010		4			
water	570	570	570	570	570
vitamin C	0.05	0.05	0.05	0.05	0.05
Biobake Pconc	0.02	0.02	0.02	0.02	0.02
Maxlife E5	0.2	0.2	0.2	0.2	0.2
Biobake ST 710	0.1	0.1	0.1	0.1	0.1
Specific volume (l/kg)	5.39	5.51	5.51	5.32	5.10
Firmness index (%) ¹	100%	74%	118%	128%	116%
Staling rate index (%) ¹	100%	85%	103%	133%	90%

¹as indexed on control²stanolester is an ester of mainly beta sitostanol, esterified with sunflower oil.

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The results in Table 3 and 4 show that CSL alone hardly affects the bread volume and reduces the firmness and staling rate. In contrast stanolesters alone have no influence on volume and increase the firmness or staling rate compared with a bread without stanolesters. They are even more deleterious than the sterolesters. The combination of stanolesters and CSL improves the volume slightly. Surprisingly it substantially decreases the firmness and reduces the staling rate.

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